



BRUSH CREEK RESERVOIR, JENNINGS COUNTY

NORTH VERNON MEETING
JANUARY 22, 2004



AGENDA

- I. Introductions
- II. Background Information
- III. Current Site Status
- IV. Project Alternatives
- V. Frequently Asked Questions
- VI. Discussion Session

BACKGROUND

DAM CONSTRUCTION: Began in 1952, dedicated in 1956

CONSTRUCTED BY STATE OF INDIANA (FLOOD CONTROL COMMISSION (DNR), STATE DEPARTMENT OF HEALTH (MSDC), AND NORTH VERNON WATER COMPANY

PROJECT COST: \$172,788.10

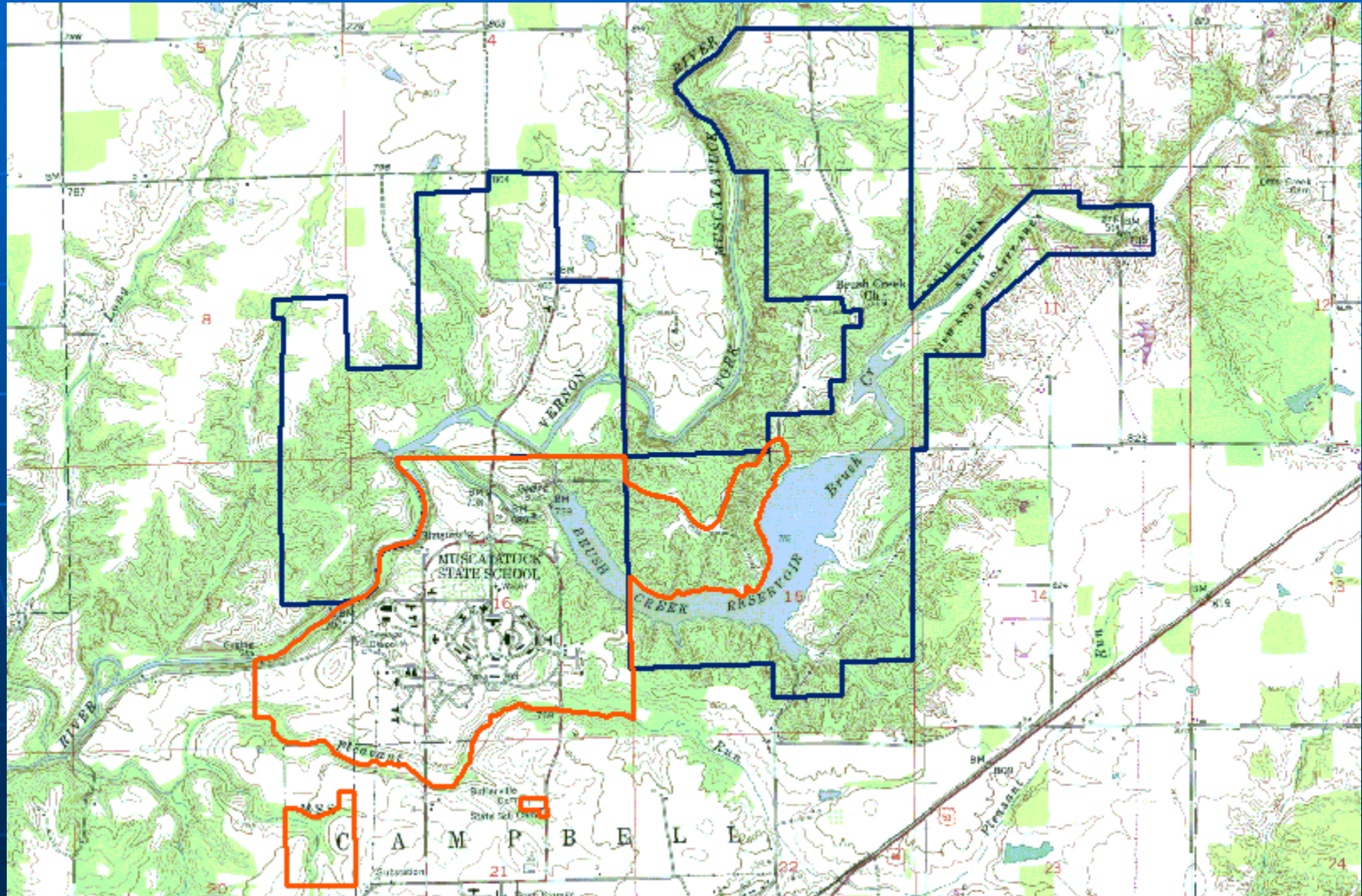
COST SHARE: 50% State, *50% Local (Trustees of the Water Works Department, City of North Vernon)

*Annual installments of \$2,160 for forty (40) years

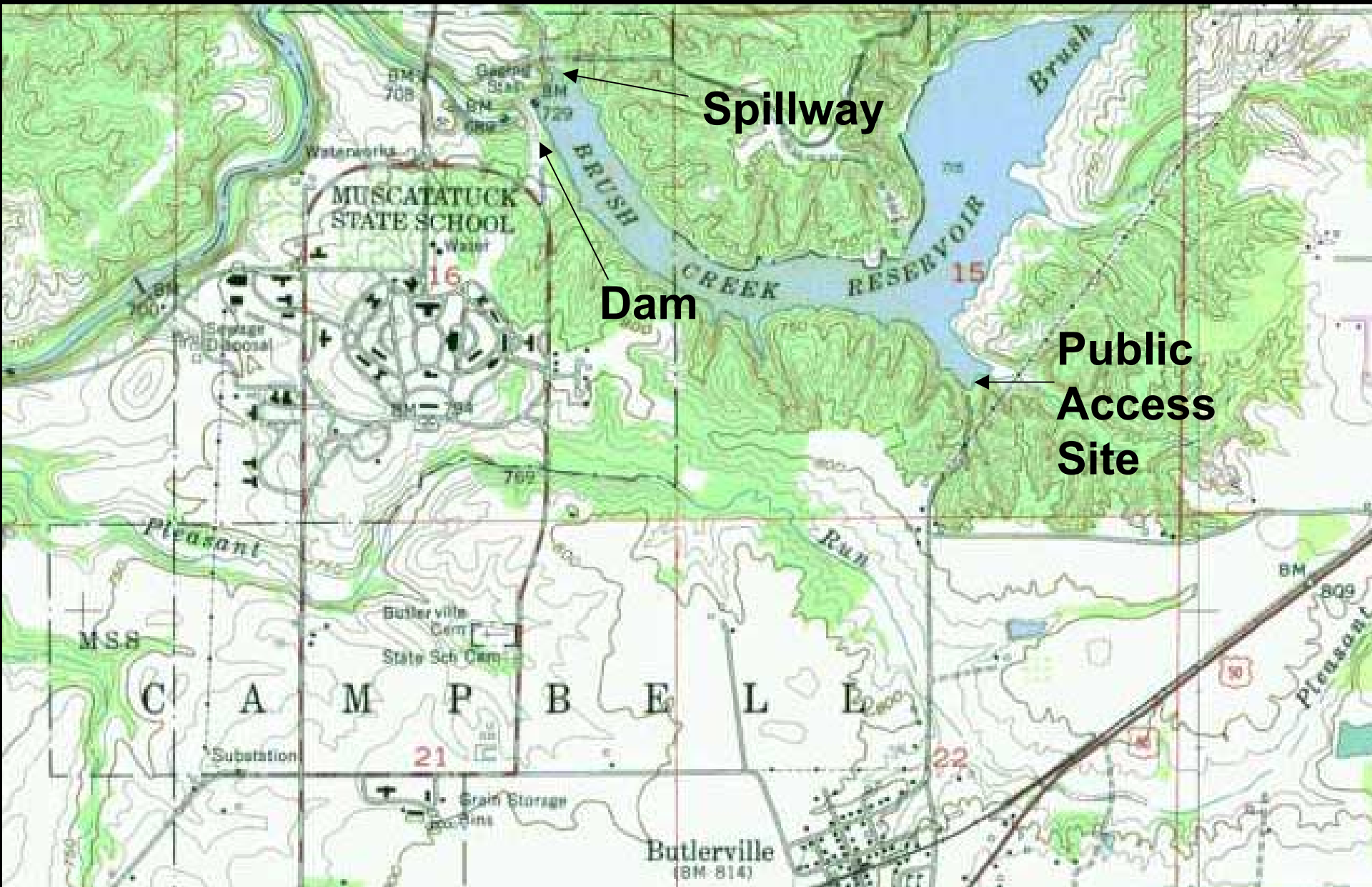
PURPOSE: BACK-UP WATER SUPPLY FOR NORTH VERNON and MUSCATATUCK STATE DEVELOPMENTAL CENTER

DNR FISH AND WILDLIFE AREA: 1964

BACKGROUND



Brush Creek Reservoir



BACKGROUND

DOCUMENTED, HISTORICAL SITE PROBLEMS

Problem:

High **sedimentation** rates have been documented.

Water Supply Storage

Public Access Issues

Actions:

Public Access Boat Ramp Dredging: Krevda, 2001

Brush Creek Reservoir Watershed Group, 2000

Watershed Diagnostic Study: Donan Engineering, 2002

Lake and River Enhancement (LARE) Program:

LARE funding total (over 3 years) = \$78,000

Total watershed acreage = 9,315 acres

Portion of watershed in farm land ~ 75%

Funding paid out for land treatment = \$39,700

Funding allocated for 2004 = \$30,000

Public Access/Boat Ramp Dredging Project



Brush Creek Watershed Group



BACKGROUND

DOCUMENTED, HISTORICAL SITE PROBLEMS

Problem:

Outlet Pipe Location caused **taste and odor** problems.

Action:

Riser Pipe Installation: Mainstream Commercial Diving, 2003



BACKGROUND

DOCUMENTED, HISTORICAL SITE PROBLEMS

Problems:

Leakage through and adjacent to the dam and at the spillway has been reported at the site since construction due to natural geologic features and problems documented at the time of construction.

Inadequate Spillway Capacity for a high hazard dam. Due to its classification, the structure must have the ability to safely pass 100% of the probable maximum precipitation (PMP); the current system only passes 50% of the PMP.

Action:

Engineering Study, Burgess and Niple Engineering, 2004

BACKGROUND

Sinkhole Discovery, Aug. 2002



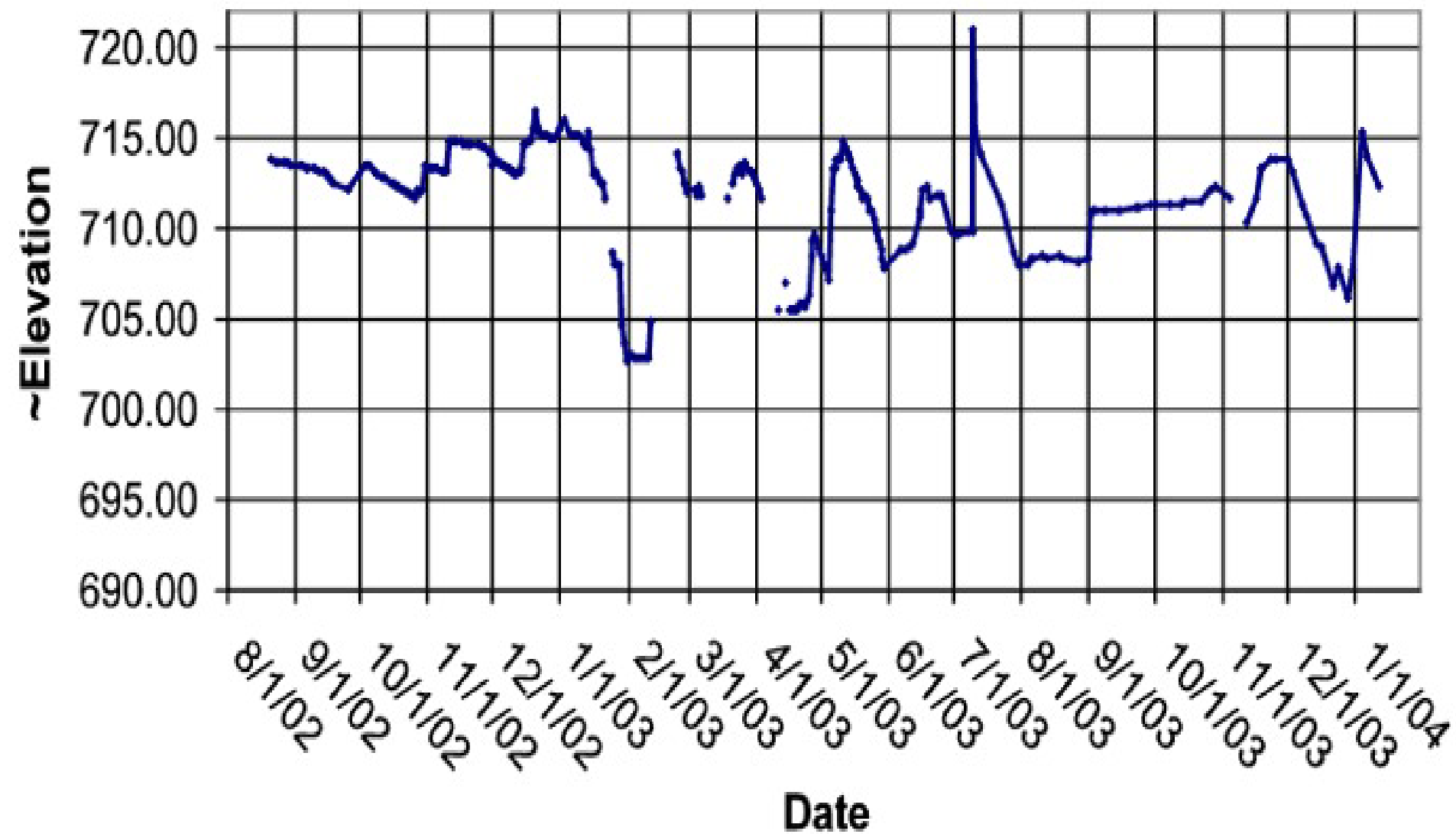
Spillway Weir Cut, 2003



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Brush Creek Reservoir Levels





Brush Creek Dam

Looking north, from the left abutment

Brush Creek Reservoir

Public access site with reservoir level ~9' below normal pool



SITE INSPECTIONS and MAINTENANCE

Fish and Wildlife Staff:

Inspections 2-3 times per week
Public access issues

Law Enforcement:

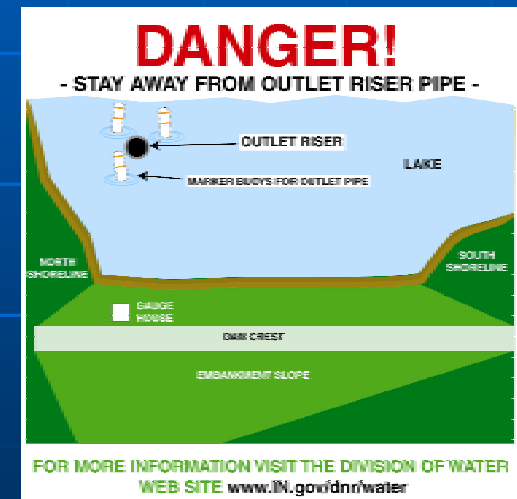
Public access issues

MSDC staff:

Inspections as needed
Valve operation
Vegetation removal

DOW staff:

Inspections as needed
Herbicide application
Monitoring data analysis
Maintain website:
www.in.gov/dnr/water/comm_assistance/selected/brushcreek





Brush Creek Dam

looking south, from the right abutment



Brush Creek Dam Spillway

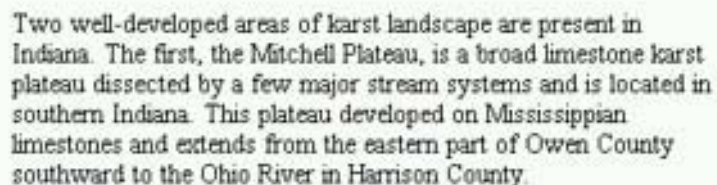
looking south / upstream

Note concrete weir and missing section

Width = 48' at the weir



- by Nancy R. Hasenmueller, Richard L. Powell, Mark A. Buehler, and Kimberly H. Sowder



Publications

- Site Search
- Publication Search
- Who to Contact for Specific Info
- Calendar
- Printing Instructions
- E-Mail Newsletter
- Jobs
- Licensed Geologist Program
- Earth Science Issues

Karst

by Nancy R.

Karst is a (limestone slowly dissolves) landscape and, there

1. Springs are places where subsurface water flows from rock or soil onto the land surface.

2. Sinkholes are funnel- or bowl-shaped basins on the land surface that formed where the limestone is dissolved and the soil layer above slopes into the resulting depression.



Diagram concept by R.L. Powell, drafted by R.S. Taylor

3. Sinking or disappearing streams are surface streams in karst areas that flow directly into the ground-water system at a place called a swallowhole.

4. Underground drainage systems, composed of conduits dissolved in the rock through which water may flow, are common in karst areas. Surface streams in a karst area are generally short and lose their water during dry periods.



Map showing physiographic divisions of Indiana. Click the map for a larger view of the regions.

Modified from Gray, H.H., 2000, *Physiographic Divisions of Indiana*, Indiana Geological Survey Special Report 61, Plate 1. Digital compilation by

Two well-developed areas of karst landscape are present in Indiana. The first, the Mitchell Plateau, is a broad limestone karst plateau dissected by a few major stream systems and is located in southern Indiana. This plateau developed on Mississippian limestones and extends from the eastern part of Owen County southward to the Ohio River in Harrison County.

The second karst area is located in southeastern Indiana and is known as the Muscatatuck Plateau. This plateau developed on limestones of Silurian and Devonian age.







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PROJECT ALTERNATIVES

Normal Pool (Lake Level 715' NGVD '29)

Engineering Report (B&N, Previous Studies)

Project Description: Grout Curtain, Supplemental Spillway
(does not include spillway grouting)

Construction Cost Estimate:	\$2,755,000
Non-Construction Cost Estimate*:	\$ 854,250
Total Cost Estimate:	\$3,609,250

*Non-Construction items include Final Design, Contingency Fee,
and Construction Management

Rock Fill Alternative (Staff)

Project Description: Excavate supplemental spillway, place
excavated rock material on downstream slope

Cost Estimate:	Less than \$1,500,000
Non-Construction Cost Estimate:	Included in above estimate
Total Cost Estimate:	Less than \$1,500,000

PROJECT ALTERNATIVES

Lower Pool (Lake Level +/- 700' NGVD '29)

Engineering Report

Project Description: Cut height of dam, place excavated material on downstream slope, reduce hazard classification

Construction Cost Estimate: \$1,090,000

Non-Construction Cost Estimate*: \$ 381,500

Total Cost Estimate: \$1,471,500

Decommissioning

Engineering Report

Project Description: Dam removal; stream restoration

Construction Cost Estimate: \$2,250,000

Non-Construction Cost Estimate*: \$ 787,500

Total Cost Estimate: \$3,037,500

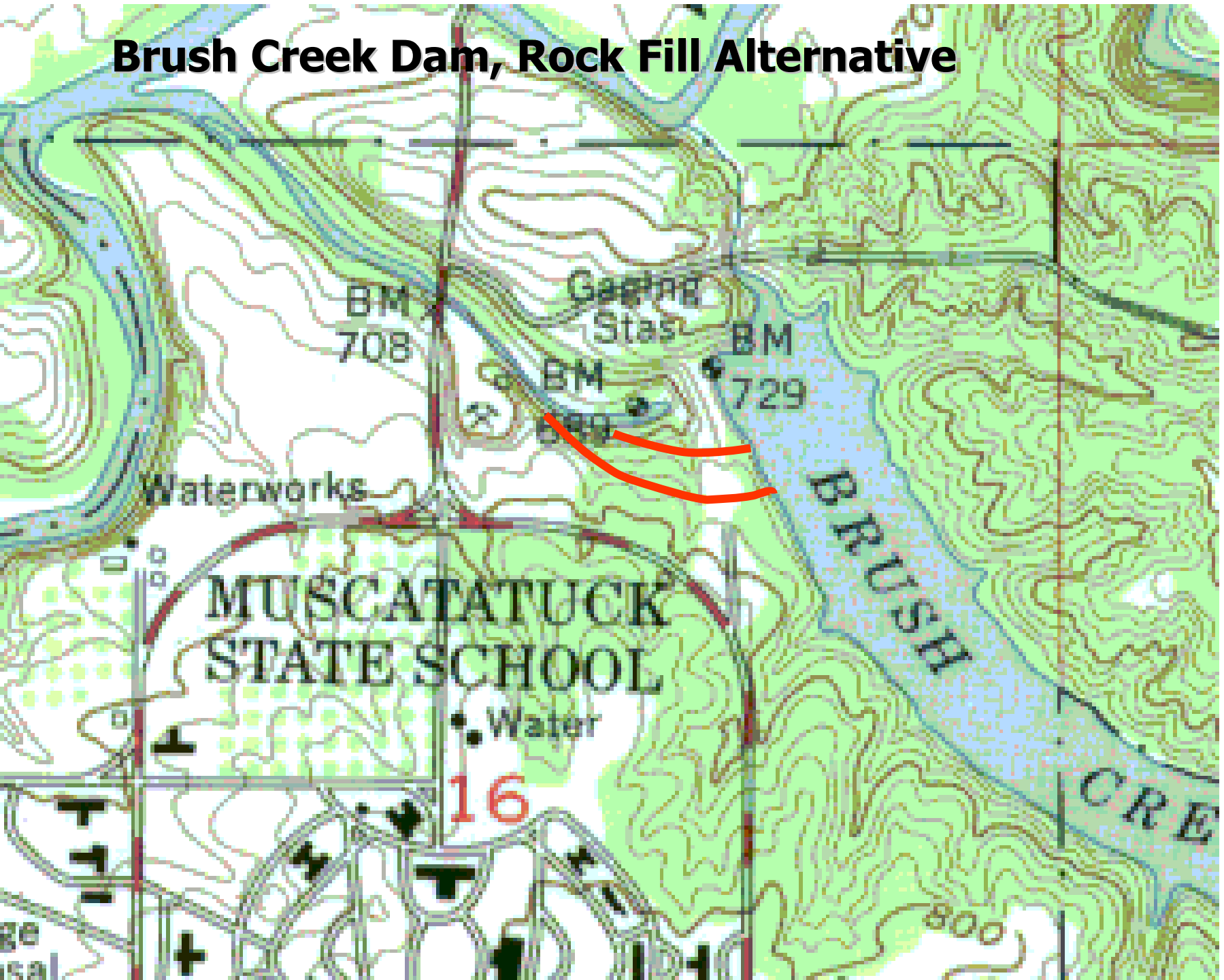
*Non-Construction items include Final Design, Contingency Fee, and Construction Management

ROCK FILL ALTERNATIVE

Considerations

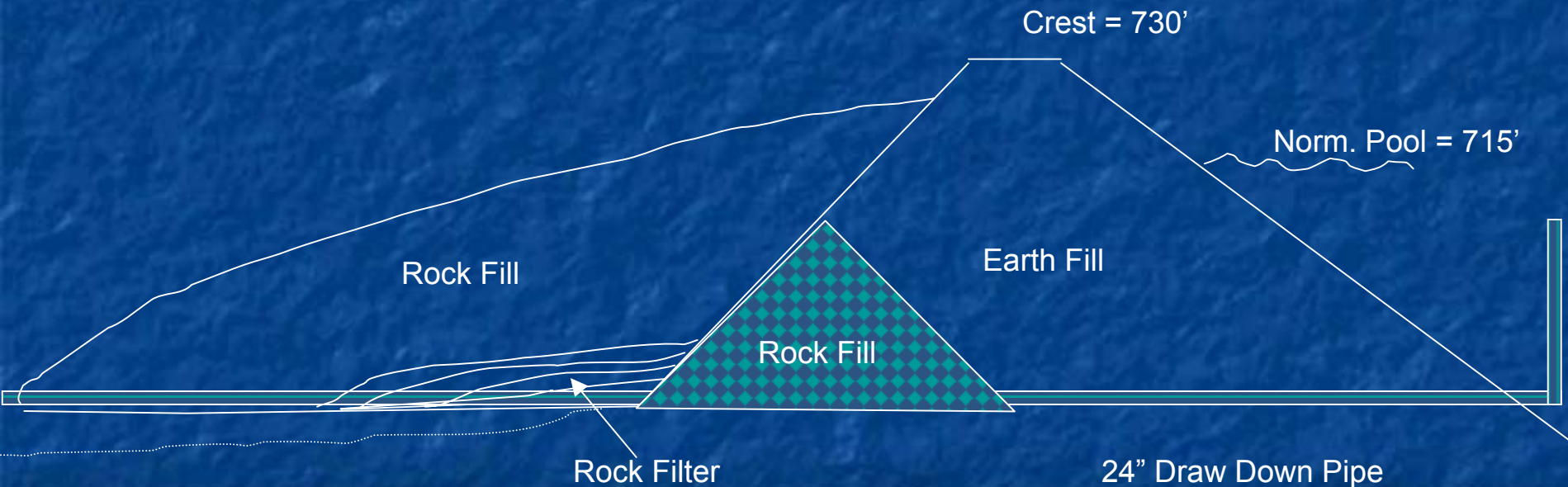
1. Dam Safety
2. Water Supply Needs
3. Recreation
4. Cost
5. Long Term Maintenance

Brush Creek Dam, Rock Fill Alternative



Brush Creek Dam, Rock Fill Alternative

Conceptual Design - All elevations NGVD'29



Design Considerations

	Rock Fill	Restore	Lower Pool	Dam Removal
Meet dam safety standards	Yes	Yes	Yes	Yes
Protection against sudden loss of pool, breaching	Yes	No	Yes	N/A
Provide for full PMF	Yes	Yes	N/A	N/A
Return to normal pool level	Yes	Yes	No	No
Provide backup water supply	Yes	Yes	Partially	No
Prevent future leakage	No	No	No	N/A
Allow future grouting	Yes	Yes	Yes	N/A
Current Public Access Site useable	Yes	Yes	No	No
Allows construction while retaining water supply pool	Yes	No	No	N/A
Change spillway dynamics below 1% flood frequency	No	No	Yes	Yes
Cost	~\$1.5 M	~\$3.6 M	~\$1.5 M	~\$3.0 M

Recommendations

- **Develop New Agreement**
 - **State and City of North Vernon**
- **Recommend Rock Fill Alternative**
- **Design Contract**
 - **DNR to complete in 2004**
- **Identify Construction Funding**
 - **DNR has shifted priorities**
- **Construction**
 - **Target construction for 2005**

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Q: *What is the status of the Water Supply Contract between the State and the City?*

A: DNR and the City of North Vernon will be entering into a new agreement.

Q: *Can the funding to address the dam safety issues be given to the City to switch to an alternative water supply source?*

A: Brush Creek Reservoir is classified as a high-hazard structure. This means that failure of the structure could potentially cause loss of life and damage to downstream properties. The deficiencies of the structure that are currently being evaluated by the DNR require remedial action in order to bring the structure up to currently accepted dam safety standards and protect the downstream property owners. No action at the site is not an alternative due to serious public safety concerns and the requirements of the Regulation of Dams Statute, IC 14-27-7.5.

Q: *Will the reservoir level be raised?*

A: No: Studies in the past indicate that increasing the pool elevation is not practical for this location. The problems associated with fractured bedrock get much worse as water pressure and saturation time increase.

Q: *Who is continuing to perform the inspections and monitoring of the dam site and seepage areas?*

A: The DNR Division of Fish and Wildlife staff continue to monitor the site, with assistance as needed from the Muscatatuck State Developmental Center and Division of Water staff.

In addition to visual inspections, the US Geological Survey, in cooperation with IDNR, operates a stream gauge upstream of the reservoir on Brush Creek near Nebraska. Stream flow at this measured point represents almost of 80% of the drainage area for the reservoir. Flow measurements recorded by this gauge are posted on the USGS internet site hourly. You can find a link to this gauge on the IDNR, Division of Water's internet site for Brush Creek Reservoir.

http://www.in.gov/dnr/water/comm_assistance/selected/brushcreek/index.html

Q: *Will the reservoir be able to supply water for North Vernon?*

A: Yes: At the present time, the operational plan for the reservoir contains sufficient water to meet any reasonable requirement by the public utility. However, the reservoir should not be considered a long term solution to meet local water supply needs. Public water supply is the primary function of the reservoir, but the public safety associated with the dam will not be compromised due to the need to maintain pool.

Q: *Is the reservoir being drained?*

A: No: A lower pool level is being maintained on average, but there are no plans to drain the reservoir in the foreseeable future.

Q: *Is the public access site closed?*

A: No: However, most of the time, trailer launching will not be possible. See the section concerning Public Access on the IDNR Division of Water's internet site for additional information.

http://www.in.gov/dnr/water/comm_assistance/selected/brushcreek/index.html

Q: *Is SEMA still tracking this matter? Has an Emergency Action Plan been finalized and distributed?*

A: Staff of SEMA have been kept informed of the status of the structure and are prepared to respond, if any significant changes at the site occur. A formal Emergency Action Plan has not been completed; however, an interim plan has been in place since the discovery of the sinkhole in August 2002. Burgess and Niple prepared hydraulic modeling and inundation mapping as part of the Engineering Study. We are still awaiting minor revisions to the mapping. Once the mapping is completed, the local community will be a critical partner in the preparation of a new Emergency Action Plan.

Q: *Did the problems with the reservoir contribute to the recent boil water order?*

A: *No. The recent boil water order two weeks ago was likely caused by high water in the Vernon Fork Muscatatuck River. A sudden increase in stream flow brought waters containing a high volume of suspended solids and mud to the processing plant. The installation of the riser pipe will help improve the water quality of released water under low flow conditions, but will not alter the water quality during periods of high stream flow.*